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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/791,841	03/04/2004	Russell May	3811-012-27	3864

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EXAMINER	
TURNER, SAMUEL A	

ART UNIT	PAPER NUMBER
2877	

DATE MAILED: 02/09/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/791,841	MAY ET AL.	
	Examiner	Art Unit	
	Samuel A. Turner	2877	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *23 March 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-53* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-53* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *26 July 2004* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *3/23/05*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

The drawings were received on 26 July 2004. These drawings are accepted by the examiner.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 50 and 51 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 50 and 51 are confusing in that they refer to the fiber or diaphragm as "also formed from a single crystal sapphire", however there is no mention of a single crystal sapphire in claim 48. The single crystal material is defined as single crystal sapphire in claim 49.

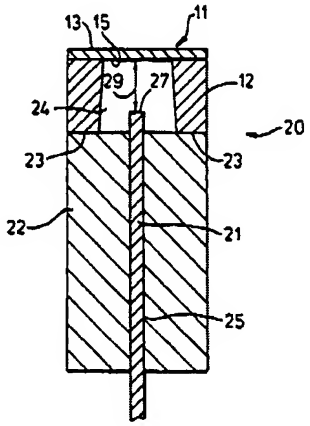
Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 2, 6, 14-17, and 21 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Totterdell et al(5,365,789).

Fig.2.



With regard to claim 1, Totterdell et al teach a sensor comprising:

a ferrule(22), the ferrule having a bore(25) formed therein;

an optical fiber disposed within the bore(21);

a spacer(12) having a first end and a second end, the first end being attached to an end of the ferrule, the spacer having an opening(24) formed therein; and

a diaphragm(15) attached to the second end of the spacer such that it extends over the opening in the spacer, the diaphragm having an inside reflecting surface facing an end of the optical fiber, the end of the optical fiber and the inside reflecting surface of the diaphragm being spaced apart to form a Fabry-Perot cavity.

As to claim 2, wherein the ferrule is formed of a single crystal material(column 3, line 45).

As to claim 6, wherein the spacer and the diaphragm are also formed from a single crystal material(column 3, lines 34-35).

As to claim 14, wherein the ferrule has a circular cross sectional shape(column 3, line 45).

As to claim 15, wherein the spacer has an annular shape with a circumference approximately equal to a circumference of the ferrule(figure 2).

With regard to claim 16, Totterdell et al teach a method for forming a diaphragm sensor comprising the steps of:

attaching a spacer to a first face of a ferrule, the ferrule having a bore formed therein, the bore intersecting the first face, the spacer having an opening formed therein, the opening being positioned over the bore(column 3, lines 40-56);

attaching a diaphragm to the spacer, the diaphragm extending over the opening in the spacer and over the bore in the first face of the ferrule(column 3, lines 40-56);

disposing an optical fiber within the bore, the optical fiber having an end(column 3, lines 40-56);

attaching the optical fiber to the ferrule(column 3, lines 40-56);

whereby the end of the optical fiber and a surface of the diaphragm extending over the bore form a Fabry-Perot cavity.

As to claim 17, wherein the ferrule is formed from a single crystal material(column 3, line 45).

As to claim 21, wherein the spacer and the diaphragm are also formed from a single crystal material(column 3, lines 34-35).

Claims 42, 46-48, 52, and 53 are rejected under 35 U.S.C. 102(b) as being clearly anticipated by Greenwood et al(4,884,450).

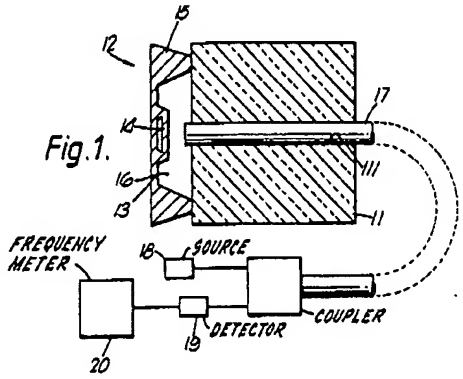


Fig.1.

With regard to claim 42, Greenwood et al teach a sensor comprising:

a ferrule(11) formed of a single crystal material(column 2, lines 12-13), the ferrule having a bore(111) formed therein;

a diaphragm(13,15) attached to the ferrule, the diaphragm having a pit formed in a surface of the diaphragm facing the ferrule, the pit having a wider diameter than a diameter of the bore, the pit having an inside reflecting surface facing the ferrule; and

a fiber(17) disposed within the bore, an end of the optical fiber and the inside reflecting surface of the pit on the diaphragm being spaced apart to form a Fabry-Perot cavity.

As to claim 46, wherein the diaphragm is also formed from a single crystal material(column 1, line 59).

As to claim 47, wherein the optical fiber is also formed from a single crystal material(column 1, line 66).

With regard to claim 48, Greenwood et al teach a method for forming a sensor comprising the steps of:

forming a pit in a face of a diaphragm, the pit having a first diameter and an inside reflecting surface(column 1, lines 57-65);

attaching the diaphragm to a ferrule, the ferrule being formed from a single crystal material and having a bore formed therein, the bore having a second diameter smaller than the first diameter of the pit(column 1, lines 49-56; column 2, lines 12-14);

disposing an optical fiber within the bore(column 1, line 66- column 2, line 1); and

attaching the optical fiber to the ferrule, an end of the optical fiber and the inside reflecting surface of the diaphragm being spaced apart to form a Fabry-Perot cavity(column 2, lines 12-25).

As to claim 52, wherein the diaphragm is also formed from a single crystal material(column 2, line 59).

As to claim 53, wherein the optical fiber is also formed from a single crystal material(column 2, line 66).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.
>
> This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 3-5, 7-9, 18-20, 22-24, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Totterdell et al(5,365,789).

Totterdell teaches a diamond diaphragm, quartz ferrule, and is silent on the fiber material and then the elements are all bonded together. The spacer substrate is polished to the desired length and then etched to expose the diaphragm.

Official notice is taken that glass, silica and sapphire are known materials in the Fabry Perot sensor art. See In re Malcom, 1942 C.D 589; 543 O.G. 440.

> If applicant does not traverse the examiner's assertion of official notice or applicant's traverse is not adequate, the next Office action will indicate that the common knowledge or well-known in the art statement is taken to be

admitted prior art because applicant either failed to traverse the examiner's assertion of official notice or that the traverse was inadequate.

With regard to claims 3-5, 7-9, 18-20, and 22-24; these claims include limitations to forming the ferrule, diaphragm, spacer, and fiber of single crystal glass, silica, or sapphire. It would have been obvious to one of ordinary skill in the art at the time the invention was made to form any or all of the elements of the sensor out of glass, silica, or sapphire depending on the environment and the need to match coefficients of expansion.

With regard to claim 28, as the spacer must be within a specific desired length, it would have been obvious to one of ordinary skill in the art at the time the invention was made to grow, etch, or cut the tube to a specific lengths. Cutting an element to a desired length is common when the element is longer than desired.

Claims 10-13, 25-27, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Totterdell et al(5,365,789) as applied to claims 3-5, 7-9, 18-20, 22-24, and 28 above, and further in view of Greenwood et al(4,884,450) and Belleville et al(5,202,939).

Totterdell et al bonds the components and does not teach welding or a partial cavity vacuum. Greenwood et al teach both welding the components and evacuating the cavity to minimize damping. Belleville et al teach welding by either CO2 laser to precisely control the process and obtain reproducible results.

With regard to claims 10-13, and 25-27; it would have been obvious to one of ordinary skill in the art at the time the invention was made modify the Totterdell

apparatus by laser welding the components in order to precisely control the process and obtain reproducible results.

With regard to claim 29, it would have been obvious to one of ordinary skill in the art at the time the invention was made modify the Totterdell apparatus by evacuating the cavity, thus forming a partial vacuum, in order to minimize damping.

Claims 30-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Balachandran et al(6,901,176).

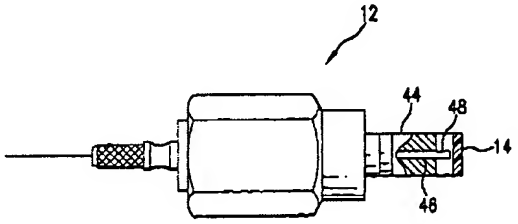


FIG.4

With regard to claim 30, Balachandran et al teach a sensor comprising:

a ferrule having a bore and pit formed therein, the pit having a wider diameter than a diameter of the bore, the bore intersecting the pit(44);

a diaphragm(44); and

a fiber(46) disposed within the bore, an end of the optical fiber and the inside reflecting surface of the diaphragm being spaced apart to form a Fabry-Perot cavity.

With regard to claim 36, Balachandran et al teach a sensor comprising the steps of:

forming a pit in a face of a ferrule, the ferrule having a bore formed therein, the pit being formed such that it intersects the bore(column 9, lines 27-45);

attaching a diaphragm to the ferrule such that it extends over the pit, the diaphragm having an inside reflecting surface facing the pit(column 9, lines 27-45);

disposing an optical fiber within the bore(column 9, lines 27-45); and

attaching the optical fiber to the ferrule, an end of the optical fiber and the inside reflecting surface of the diaphragm being spaced apart to form a Fabry-Perot cavity(column 9, lines 27-45).

Note that Balachandran et al is silent on the structure of the ferrule and fiber, and teaches a diaphragm of Mylar.

With regard to claims 30, 34, 35, 36, 40, and 41; it would have been obvious to one of ordinary skill in the art at the time the invention was made to form any or all of the elements of the sensor out of a single crystal material depending on the environment and the need to match coefficients of expansion.

With regard to claims 31-33, and 37-39; it would have been obvious to one of ordinary skill in the art at the time the invention was made to form any or all of the elements of the sensor out of sapphire depending on the environment and the need to match coefficients of expansion.

Claims 43-45, and 49-51 are rejected under 35 U.S.C. 103(a) as being unpatentable over Greenwood et al(4,884,450).

Greenwood et al teach a silicon crystal diaphragm, glass ferrule, and silica fiber. Sapphire components are not taught.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to form any or all of the element of the sensor out of sapphire depending on the environment and the need to match coefficients of expansion.

Double Patenting

For the below Obvious Double Patenting rejections, it is assumed that the applications were commonly owned at the time of invention. It is noted however that no statement that the applications were commonly owned at the time of invention.

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington,* 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claims 30, 34-36, 40, and 41 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1, 11, and 14 of copending Application No. 10/781,842 in view of Greenwood et al(4,884,450).

This is a provisional obviousness-type double patenting rejection.

With regard to claim 30, claim 1 of application 10/781,842 claims a sensor comprising(line 1):

a ferrule, the ferrule having a bore formed therein, the ferrule having a face, the face having a pit formed in a face therein, the pit having a wider diameter than a diameter of the bore, the bore intersecting the pit(line 2-4);

a diaphragm attached to the ferrule such that it extends over the pit, the diaphragm having an inside reflecting surface facing the pit(lines 5-6); and

a fiber disposed within the bore, an end of the optical fiber and the inside reflecting surface of the diaphragm being spaced apart to form a Fabry-Perot cavity(lines 7-9).

With regard to claim 36, claim 14 of application 10/781,842 claims a method for forming a sensor comprising the steps of(line 1):

forming a pit in a face of a ferrule, the ferrule having a bore formed therein, the pit being formed such that it intersects the bore(lines 2-3);

attaching a diaphragm to the ferrule such that it extends over the pit, the diaphragm having an inside reflecting surface facing the pit(lines 4-5);

disposing an optical fiber within the bore(line 6); and

attaching the optical fiber to the ferrule, an end of the optical fiber and the inside reflecting surface of the diaphragm being spaced apart to form a Fabry-Perot cavity(lines 7-9).

Application 10/781,842 claims that the ferrule is formed of a crystal material but fails to claim that the ferrule, diaphragm, and fiber are each formed of a single crystal material.

Greenwood et al teach a silicon crystal diaphragm, glass ferrule, and silica fiber.

With regard to claims 30, 34-36, 40, and 41; it would have been obvious to one of ordinary skill in the art at the time the invention was made to form the ferrule, diaphragm, and fiber each out of a single crystal material in order to reduce the number of sensor components.

Claims 30, 34-36, 40, and 41 directed to an invention not patentably distinct from claims 1, 11, and 14 of commonly assigned 10/781,842. Specifically, see the above double patenting rejection.

The U.S. Patent and Trademark Office normally will not institute an interference between applications or a patent and an application of common ownership (see MPEP § 2302). Commonly assigned 10/781,842, discussed above, would form the basis for a rejection of the noted claims under 35 U.S.C. 103(a) if the commonly assigned case qualifies as prior art under 35 U.S.C. 102(e), (f) or (g) and

the conflicting inventions were not commonly owned at the time the invention in this application was made. In order for the examiner to resolve this issue, the assignee can, under 35 U.S.C. 103(c) and 37 CFR 1.78(c), either show that the conflicting inventions were commonly owned at the time the invention in this application was made, or name the prior inventor of the conflicting subject matter.

A showing that the inventions were commonly owned at the time the invention in this application was made will preclude a rejection under 35 U.S.C. 103(a) based upon the commonly assigned case as a reference under 35 U.S.C. 102(f) or (g), or 35 U.S.C. 102(e) for applications pending on or after December 10, 2004.

Relevant Prior Art

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Murphy et al(5,381,229) and Sherrer et al(6,738,145) are cited for there Fabry Perot senor configurations.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Samuel A. Turner whose phone number is 571-272-2432.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Toatley, Jr., can be reached on 571-272-2800 ext. 77.

The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see **http://pair-direct.uspto.gov.** Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Samuel A. Turner
Primary Examiner
Art Unit 2877